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Running head: INSURANCE CLAIM DENIALS

Insurance Claims: A Study in Denials

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ABSTRACT

The study was to analyze the insurance claim denials to determine if Baptist Health System (BHS) of San Antonio, TX was increasing (declining) or decreasing (improving) their denial rates. The data were obtained from the BHS's financial systems program. The model tested to be statistically significant using the Total Denial ANOVA table. The NULL hypothesis will be rejected and the ALTERNATE hypothesis will be accepted. $F = 4.7 \, (4,115) \, p = .001$. The BHS has decreased their Overall denial rates by approximately 50% over the last 12 months (April 2006 to March 2007) from the previous 12 months (April 2005 to March 2006). BHS also shows a positive downward trend in all the sub-study groups: facilities, denial categories and patient categories.

ACKNOWLEDGEMENTS

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How important are denials to your organization? Denials management has become one of the most hotly debated topics in health care. More and more hospitals are looking to a denial management program to counter the effects of diminishing reimbursements. "As leaders in healthcare, provider organizations have a much greater responsibility to start managing productivity and efficiencies of their operations versus managing denials." (Grzybowski, 2006).

Statement of the Problem

Insurance claim denials have a large impact on the financial bottom line for healthcare providers. Insurance claim denials are a focus for the Baptist Healthcare System. Some of the issues within this health system are: What are the insurance claim denial rates? How effective are steps to decrease claim denials? How does each facility fit into the total denials? Are the steps that are being taken reducing denials rates?

Literature Review

A review of the scientific and academic literature was completed. Hospitals are constantly looking for ways to improve their operating margins. Hospital executives are boosting their bottom lines by focusing new energy on an old problem: claims denials (HFMA Roundtable, 2006). Hospitals across the country lose multiple millions of dollars every year due to mismanagement of the billing process (HFM, Oct 2005). "No matter the size of the organization, billing inconsistencies affects all healthcare facilities to some degree. On average, providers lose 5 percent of gross revenues, and that can translate into millions of dollars for a single organization" (HFM, 2005). These errors lead to insurance companies denying claims. "One study by America's Health Insurance Plans found that 14 percent of claims submitted to payers are denied and one out of every seven claims had to be resubmitted, appealed, or written

off by providers. That represents millions of dollars in lost revenue that some CFOs aren't even

looking for." (2005 HFM, page 2)

Denial Definition

What is the definition of an insurance denial? "Perhaps no one knows the exact origin of

the term, but denials management inevitably reflects the practice of studying returns from

insurance providers after the healthcare provider is informed that they will not receive any or all

of the reimbursement they expected-or at least that they billed-and that something is awry in the

business" (Grzybowski, 2006). Citerone and Phillips (2004) define a denial as "any claim that is

not paid, regardless of the reason. Sources of a denial can be technical, administrative, or

clinical." A definition can be defined many ways dependent upon the area of responsibility. A

case manager typically relates denials issues of medical necessity, patient finance services may

relate denials to being nickeled and dimed to death and CFOs may equate a denial to anything

that results in a loss of revenue" (Robertson & Dore, 2005). The uniform definition given by the

Advisory Board Company (June 2005) Financial Leadership Council Revenue Cycle Insight

Brief Breakthrough Denials Performance is "a denial is an adverse payment determination issued

by any payer for any reason. It does not include short-pays such as contract interpretation,

administration, or incorrect payment issues".

In a 2004 survey of healthcare CEOs conducted by the American College of Healthcare

Executives, 70 percent of the respondents identified financial challenges as their top concern and

50 percent identified the revenue cycle and denials management as one of the top five financial

challenges (Robertson & Dore, 2005). In 2000, reducing denials represented the largest revenue

opportunity in the revenue cycle, according to the Health Care Advisory Board (Citerone &

Phillips, 2004).

Categorizing Denials

One way to categorize denials is to break up within two categories; claims level denials and service level denials. A claims level denial is a denial of the entire claim. Claims level denials typically result from problems or inaccuracies related to patient registration, late-charge management, duplicate billing, production of medical information for external review, and physician ordering practices. Service level denials involve denials of only portions of the claim associated with individual services. These often result from problems with patient registration, medical necessity, issues related to local medical review policies, and inaccurate diagnostic and procedural coding processes (Hodges, 2002).

Robertson and Dore (2005) categorize denials into two basic types: soft and hard. A soft denial is a temporary or interim denial that has the potential to be paid if the provider takes the right follow-up actions. These are often considered controllable or preventable denials. A hard denial is often considered by the provider to be lost or written-off revenue. Providers can track lost denials of their information systems using the transaction write-off codes. Beyond the two basic types of denials, denials can be even further broken into the similar categories stated above: clinical, technical, short pay, or defined with specific root-cause descriptions (Robertson & Dore, 2005).

Origin of Denials

Most, if not all, denials originate at the point the patient is scheduled/pre-registered but most people think denials originate with the billing staff (Laubach, 2004). Problems with claims that originate at patient registration are common because this function is decentralized in many healthcare organizations, particularly for outpatient services (Hodges, 2002). The data gathered at the time of (pre)registration with the organization are key to ensuring the claim that is billed is

the most accurate and will be reimbursed properly. "At some hospitals, denials related to errors at the time of registration account for as much as 60 percent of total denied claims. Often, the source is a simple mistake that could easily have been avoided: accepting an expired insurance card, transposing a digit or missing a code" (Oct 2005, HFM). The origin of most denials can be traced back to inaccurate and incomplete information obtained at the time insurance verification. Denial reasons or explanations such as "coverage terminated prior to admission," "non-covered service," "benefits exhausted," and "no authorization," are all routinely linked to procedural lapses during the course of verifying insurance coverage (Allen, 2006a).

According to a 2005 Web survey of health plans, the most common reasons health plans deny services are:

1. The services are not medically appropriate (47 percent).

2. The health plan lacks information to approve coverage of the service (23 percent).

3. The service is a non-covered benefit (17 percent).

When informing physicians of a denial of services, health plans are required to state the exact reason for the denial and provide an opportunity for the physician to discuss the denial with the reviewer (Akosa, 2006). "Hospitals generally focus on utilization review or medical necessity issues when managing denials. However, this often accounts for less than 5 percent of all denials. If denial equals zero payment, the admitting and patient access departments typically account for more than half of all denials. Most denials occur before patient care even begins due to incomplete or inaccurate information being gathered at the time of registration. Next, deficient processes in the billing office may give rise to 25 percent or more of a hospital's total denials" (Atchinson, 2003).

Aside from the direct impact from lost revenue, there is an indirect impact on resources due to the expense associated with reprocessing and appealing the denied claims. The importance of well-trained staff cannot be overstated. Employee errors are one of the main reasons for missed charges and even overcharging. In addition to having the right number of people in place, hospitals need to ensure they possess the right skill set and provide them with the proper level of training. Automation in this field will help curb this problem.

Denials: Medical Necessity – Medical Benefit

One of the first steps to understanding and responding to denials is recognizing the difference between medical necessity and medical benefits. "Denials related to medical necessity and failures to provide information usually are due to inaccurate diagnostic coding and/or medical record documentation to support the services billed. During the billing process, a claim may be flagged for pre-billing review. These claims become suspended in the system pending review" (Hodges, 2002). Additional medical information is requested from the servicing department. If this information is not produced, the claim is automatically denied.

Medical necessity and medical benefits are distinct concepts that patients and physicians struggle to understand (Bare, 2001). Appendix A shows the difference between medical benefit and medical necessity according to Bare. Health plans frequently attribute denials to their determination that a service is not necessary or that it is not a covered benefit. There are many different definitions to medical necessity. "From the perspective of the health plan, a patient's needs are based on medical necessity, which takes into account perceived clinical necessity plus corporate protocols and standards that reflect economic criteria such as relative cost-effectiveness, the availability of less costly alternatives and the benefit structure of the patient's health plan" (Bare, 2001). Medicare defines medically necessary services or supplies as those

that are proper and needed for the diagnosis or treatment of the patient's medical condition, meet the standards of good medical practice in the local area and are not mainly for convenience (Akosa, 2006). Medical necessity is required under Section 1862(a)(1)(A) of the Social Security Act. This section lays out Medicare's regulatory structure for determining medical necessity. The degree of conflict surrounding health plan denials depends in a large part on the reason given for the denial. The health plan may simply disagree with the physician's recommendation or may argue that it conflicts with the health plan's protocol for the disease or condition in question (Bare, 2001).

When a service does not meet medical necessity, hospitals can issue an Advanced Beneficiary Notice (ABN) to the patient, giving the patient the opportunity to pay for the amount of service that Medicare or a third party payer will not cover. The Centers for Medicare and Medicaid Services define an ABN as a written notice which a physician or supplier gives to a Medicare/third party insurance beneficiary. The purpose of an ABN is to inform a beneficiary before he or she receives specified items or services that Medicare/a third party probably would not pay for.

<div align="center">Analysis of Denials</div>

Healthcare finance professionals and other employees from departments involved with a hospital's revenue cycle can work together in many ways to minimize denials, delays, and write-offs. While the foundation for most denials is initiated in the patient access area of the hospital, the business office inevitably will be left with the arduous task of resolving the problems of claim denials. Placing the responsibility for correcting front-end errors with the business office does not resolve the problem because it neglects to place accountability at the point of admission (Allen, 2006b). Therein lies one of the biggest issues. One of the most effective ways to prevent

or deter claim denials is to focus attention on the hospital's front-end processes. "An educated front-end staff, clearly outlined processes for the retrieval of information from patients and third-party payers, and a commitment to accurate and detailed system documentation are all powerful tools in a hospital's battle to combat declining reimbursement" (Allen, 2006b).

The analysis of insurance denials is often multifaceted and getting a claim paid properly is often difficult. Successful denial management is critical to cash flow. "By understanding the importance of managed care denial and recovery rates, healthcare financial managers are best positioned to help their organizations achieve optimal revenue-cycle performance and an improved bottom line" (Citerone & Phillips, 2006). "As leaders in healthcare, provider organizations have a much greater responsibility to start managing productivity and efficiencies of their operations versus managing denials. If they don't reduce these errors to begin with and just keep applying band-aid style fixes, denials management will become a bad habit like write-offs" (Grzybowski, 2006). As Jack Welch, former CEO of General Electric, once proclaimed, "What gets measured gets managed." To help manage denials, Atchison suggests the following benchmarks as a guide when measuring denials and/or the denials process.

1. Denials due to lack of authorization: less than 1 percent.

2. Denials due to patent ineligibility: less than 0.5 percent.

3. Patients preregistered before admission and their authorizations in hand: at least 90 percent.

4. Denials due to data-entry errors or incomplete information on a claim: less than 0.5 percent.

5. Co-payments and deductibles collected from the patient at the time of registration: at least 25 percent.

Denial claims are a healthcare provider's bane. Claim denials are not discriminatory; it does not matter if you are a hospital, a health system, physician group or post-acute care facility. Denials management is too important to a provider's financial health to be addressed haphazardly. Denials represent not only uncollected revenue; they also are the cause of hidden expenses in items that have to be resubmitted, appealed and reworked. Hospital executives are boosting their bottom lines by focusing new energy on an old problem: claims denials (HFMA Roundtable, 2006).

Measurement of all denial related issues would lead to a creation of a very in-depth denial database that can be used for measurement and analysis (Waymack, 2004). A comprehensive analysis of the denial database should yield an indication of how the denial rate has changed over time in various areas. This analysis may also bring to light organization unique problems. Best practice organizations have used the findings of their data analyses to alert payers to problems that are causing higher denial rates (Waymack, 2004).

Effective Denials Management

A multi-disciplinary team should conduct the improvement initiatives under this process. Representatives should include registration, pre-certification management, billing and collecting, contracting, and coding. The reason for this is to try and prevent the "Eligibility Quagmire".

THE ELIGIBILITY QUAGMIRE

At 10 days, provider drops bill to payer1.

10 days required for provider to receive & post denial to patient's account.

10 days for provider to resubmit bill to payer 2

Service delivered by provider

30 days later, payer 1 denies eligibility or retroactively adjusts it if capitated.

20 days lapse for provider to contact member & identify new payer eligibility.

Payer 2 must receive bill in 10 days in order to meet payer 2's timely filing window of 90 days.

Action

Day

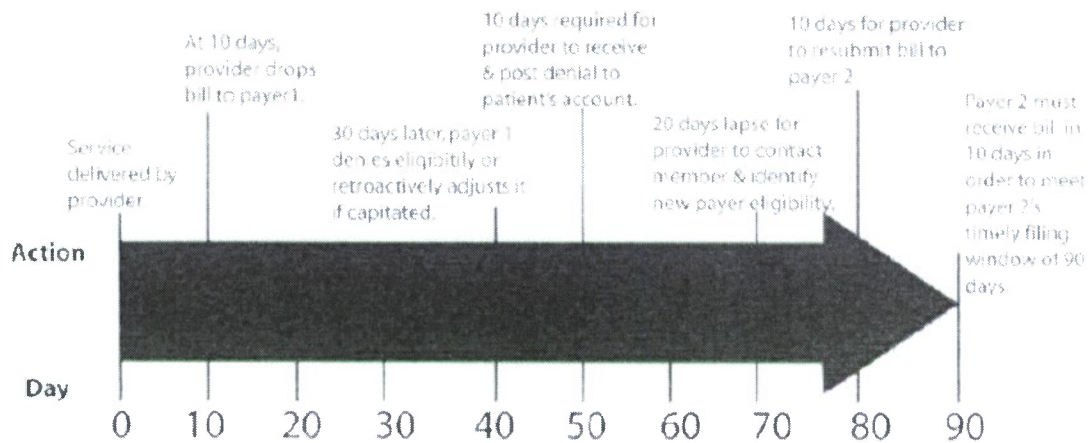0   10   20   30   40   50   60   70   80   90

Figure 1. The Eligibility Quagmire. This time line illustrates the difficulty of making even a 90-day prompt filing requirement for a second payer when initial eligibility is incorrect or retroactively changes only 40 days after service is provided.

This "Quagmire" has become more prevalent as payers have shortened the window for claim submission, some as short as 30 days, but more commonly 90 days. A fully automated and integrated process to verify eligibility of all is a likely outcome of this step. The Health Insurance Portability and Accountability Act provides an electronic standard for eligibility requirements that all payers must support. Best practice organizations utilize a multitude of electronic verification resources. Checking eligibility is just one of the processes than can be automated; others include: case management ensuring authorizations are on file, billing processes, and appeal management processes (Waymack, 2004).

Waymack (2006) later stated that one executive should be appointed to oversee the denials management process to ensure that new problems do not arise. This individual should be responsible to oversee the denial initiatives and raise awareness of potential problems

(Waymack, 2004). Denials need to be treated as a threat to the provider's financial health that they really are. Continuous monitoring and communication is the key to this commitment.

For effective denials management, it is important to develop a thorough understanding of payer procedures, contract provision, and reasons for payment denial. With this knowledge base, focus can then turn to addressing both preventive and reactive processes (Schardt & Harkins, 2005). It is imperative to continue measuring the causes of denials even after reaching a goal or results my slowly slip away. A question that all members of the organization within the denials process should constantly ask: What can I do to further engage staff and management in reducing denials?

Purpose

The purpose of this paper is to conduct research on claims denials from medical insurance companies on the hospital system as a whole. From this research, the denial rate will be determined if it is improving or declining of the Baptist Health System located in San Antonio, Texas. The unit of analysis is monthly denials from the BHS, collected from all 5 healthcare facilities in the San Antonio are, over a timeframe of 24 months. Although the main purpose is to study the denial rates of the BHS as a whole, individual hospital data was also studied. This data for this study were obtained from the BHS financial system, AVEGA.

Methods and Procedures

This study represented a retrospective longitudinal study. Specifically, the research will be a panel study of the BHS as a whole, which is comprised of 5 hospital facilities. By definition, a longitudinal study is a correlation research study that involves observations of the same items over long periods. Panel studies sample a cross-section and survey it at intervals. Retrospective studies look back in time. An Analysis of Variance (ANOVA) table was utilized

in this study. The One-Way ANOVA compares the mean of one or more groups based on one independent variable. The ANOVA was chosen to compare the denial means of the different medical treatment facilities of the BHS. A sampling of the denials for the BHS was chosen over the fiscal years 2006 and 2007.

The hypotheses statements for this study are presented below:

H_a = There is at least one significant difference within claims data between groups.

H_0 = There is no significant difference within claims data between groups.

The null hypothesis for this study is represented by $H_0 = \mu1 = \mu2 = \mu3 = \mu4 = \mu5$ in that there would be no significant difference between means of the claims data of the hospitals. The alternate hypothesis for this study is represented by $H_a = \mu1 \neq \mu2 \neq \mu3 \neq \mu4 \neq \mu5$ in that there is at least one significant difference in means between claims data.

The alpha probabilities for this study were set at the $p < .05$ level and all statistical analyses were conducted utilizing the Statistical Package for the Social Sciences (SPSS) 12.0.2 (SPSS Inc. 2004) and Microsoft Excel Analysis Tool. Given this finding, the null hypothesis would be rejected and the alternate hypothesis would be accepted. If $p < .05$, there is a significant difference in mean values (the means are "statistically" NOT equal): REJECT Null hypothesis in favor of the Alternate hypothesis. If $p > .05$ there is no "significant" differences in means (the means are NOT "statistically" different from each other, albeit they may be numerically different): ACCEPT Null Hypothesis.

A one-way analysis of variance (ANOVA) is used when there is a categorical independent variable (with two or more categories) and a normally distributed interval dependant variable and the researcher wishes to test for differences in the means of the dependant variable broken down by the levels of the independent variable (http://www.ats.ucla.edu, retrieved 12

February 2007). The ANOVA is a parametric test. According to Webster University (http://www.webster.edu/~woolflm/statwhatis.html retrieved 7 June 2007), parametric means that it meets certain requirements with respect to parameters of the population (for example, the data will be normal and the distribution parallels a normal or bell curve). In addition, it means that numbers can be added, subtracted, multiplied, and divided. Parametric data are analyzed using statistical techniques identified as parametric statistics. As a rule, there are more statistical technique options for the analysis of parametric data and parametric statistics are considered more powerful than non-parametric statistics. The analysis of variance assumes that the underlying distributions are normally distributed and that the variances of the distributions being compared are similar. Table 1 displays the ANOVA table by facility. Table 2 displays the ANOVA table for the first 12 month sample by facility. Table 3 displays the ANOVA for the last 12 month sample by facility. Table 4 displays the ANOVA for the first and last 12 month samples as the groups.

Table 1.

ANOVA by facility for total sample, n(24)

SUMMARY							
Groups	Count	Sum	Average	Variance			
BMC	24	1711358	71306.58	3008134364.60			
NCB	24	1131035	47126.46	1198511334.26			
NEB	24	866946	36122.75	807129619.41			
SEB	24	731381	30474.21	570331716.17			
St_Lukes	24	941629	39234.54	911482898.09			
ANOVA							
Source of Variation	SS	df	MS	F	P-value	F crit	
Between Groups	24467872148	4	6116968037	4.7086	0.001	2.45057	
Within Groups	1.49399E+11	115	1299117987				
Total	1.73866E+11	119					

Table 2.

ANOVA by facility for first 12 month sample, n(12)

SUMMARY

Groups	Count	Sum	Average	Variance
BMC F 12	12	1079056	89921.33	3921968682
NCB F12	12	714697	59558.08	1684062175
NEB F 12	12	620886	51740.50	926888298.1
SEB F 12	12	485462	40455.17	765895668.5
St_Lukes F 12	12	678400	56533.33	735798251.5

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	16284925832	4	4071231458	2.533557883	0.050	2.539688635
Within Groups	88380743823	55	1606922615			
Total	1.04666E+11	59				

Table 3.

ANOVA by facility for last 12 month sample, n(12)

SUMMARY

Groups	Count	Sum	Average	Variance
BMC L 12	12	632302	52691.83	1611747351
NCB L12	12	416338	34694.83	484726323.6
NEB L 12	12	268042	22336.83	186884577.2
SEB L 12	12	245919	20493.25	209264401.5
St_Lukes L 12	12	338205	28183.75	432169087.3

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	8102979156	4	2025744789	3.463058174	0.013	2.539688635
Within Groups	32172709152	55	584958348.2			
Total	40275688307	59				

Table 4.

ANOVA by facility for last 12 month sample, n(12)

SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Total Denials First 12	12	3578501	298208.4	2.28E+10		
Total Denials Last 12	12	1900805	158400.4	7.82E+09		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.17E+11	1	1.17E+11	7.667766	0.011	4.300949
Within Groups	3.36E+11	22	1.53E+10			
Total	4.54E+11	23				

The remaining ANOVA tables will be represented in Appendix B, Tables B1 and B2.

This procedure employs the statistic (F) to test the statistical significance of the differences

among the obtained MEANS of two or more random samples from a given population. More

specifically, using the Central Limit Theorem, one calculates two estimates of a population

variance.

(1)   An estimate in which the s square of the obtained means of the several samples is

multiplied by the n (the size of the samples).

(2)   An estimate that is calculated as the average (mean) of the obtained s squares of

the several samples.

The statistic (F) is formed as a ratio of (1) over (2). If this ratio is sufficiently larger than 1, the

observed differences among the obtained means are described as being statistically significant.

The top section is a break-out of the different groups being analyzed. The groups for this

ANOVA are broken down by facility. The remainder of the top section is the count, sum, mean,

variance and standard deviation of each individual group. The bottom portion of the ANOVA

table determines the significance. This research only had two groups, between groups and within

groups. The next column is the Sum of Squares (SS). The Total Sum of Squares (SST) explains

the total variation in Population (variance measures average). If this is large, the null may be rejected. The Between Groups SS is the Treatment Sum of Squares (SSTR). If the difference between sample means is large, the SSTR is large and the null may be rejected. The Within Groups SS is the Error Sum of Squares (SSE); this is the unexplained variation in each sample. The greater the value, the greater the variation in the treatment. The next column over is the degrees of freedom (df). The Total df is the total number within the sample minus one. The Between Groups df is the number of groups minus one. The Within Groups df is the total sample size minus the total number of groups. The Means Squared (MS) is the next column. The Between Groups MS is the Means Square for Treatments (MSTR). This explains the average variation among sample means. The number becomes smaller based on degrees of freedom. The Within Groups MS is the Mean Square Error (MSE). The MSE measures how far the estimator is off from what it is trying to estimate; accuracy of the estimator. The MS is the SS divided by the df. The ANOVA generates an F value. This is computed by the MSTR being divides by the MSE. The greater the F the more significant the data is. The resulting test statistic value would then be compared to the corresponding entry on a table F-test critical values.

Table 1 produced a p value of .001. The p value is .001 which is lower than the alpha value of .05 to determine statistical significance. With this low of p value, the NULL hypothesis will be rejected and the ALTERNATE hypothesis will be accepted. $F = 4.7$ $(4,115)$ $p = .001$.

Table 2 produced a p value of .050. The p value is .050 which is the alpha value of .05 to determine statistical significance. With this low of p value, the NULL hypothesis will be rejected and the ALTERNATE hypothesis will be accepted. $F = 2.5$ $(4,55)$ $p = .050$.

Table 3 produced a p value of .013. The p value is .013 which is lower than the alpha value of .05 to determine statistical significance. With this low of p value, the NULL hypothesis will be rejected and the ALTERNATE hypothesis will be accepted. $F = 43.5\ (4,55)\ p = .013$.

Table 4 produced a p value of .011. The p value is .011 which is lower than the alpha value of .05 to determine statistical significance. With this low of p value, the NULL hypothesis will be rejected and the ALTERNATE hypothesis will be accepted. $F = 7.7\ (1,22)\ p = .011$.

In all cases, the NULL hypothesis would be rejected and the ALTERNATE hypothesis would be accepted.

Findings

Descriptive Data

The descriptive data is in Table 5 is by facility for the total n(24) sample. Table 6 is by group of first and last 12 month samples of n(12).

Table 5.

Descriptive Statistics by facility, n(24)

	BMC	NCB	NEB	SEB	St_Lukes	Total_Denials
Mean	71306.58	47126.45	37038.64	30474.20	42358.52	228304.42
Standard Error	11195.48	7066.68	5620.70	4874.81	5657.78	28671.21
Median	55060.5	35017	28039.5	22776.5	38697.5	164757.5
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	54846.46	34619.52	27535.72	23881.61	27717.39	140459.68
Sample Variance	3008134365	1198511334	758216102.9	570331716.2	768253719.8	19728921721
Kurtosis	3.87	-0.06	0.79	1.87	0.09	-0.15
Skewness	1.69	0.93	1.069	1.27	0.76	1.00
Range	239451	119441	111297	97739	101548	487599
Minimum	12206	8402	-2614	3564	8451	60398
Maximum	251657	127843	108683	101303	109999	547997
Sum	1711358	1131035	888927.5	731381	1016604.67	5479306.17
Count	24	24	24	24	24	24

Table 6.

Descriptive Statistics for first and last 12 months, n(12)

	N	Range	Min	Max	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
										Std.		Std.
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Error	Statistic	Error
First12	12	435640	112357	547997	298230.99	43552.377	150869.861	2.276E10	.415	.637	-1.239	1.232
Last12	12	294645	57862	352507	157875.56	25625.563	88769.554	7.880E9	1.675	.637	1.998	1.232
Valid N	12											

Normality

In determining if this study is normally distributed, four tests were performed.

Histograms were generated through SPSS on the totals n(12) and n(24). A histogram displays

the distribution of a quantitative variable by showing the relative concentration of data points

along different sections of the scale, which are being measured. The insertion of the normal

curve displays the distribution of the variable if the distribution is perfect. Typically a normal

distribution is if greater than 67% of the values are under the normal curve (Coppola, 2006). In

analyzing the histogram, *Figure 2*, this sample is normally distributed by visual analysis. This is

supported by comparing the standard deviation of 144,030 to the mean of 224,013. The first 12

month histogram is depicted in *Figure 3* and the last 12 months depicted in *Figure 4*. The

standard deviations for the first and last 12 months respectively are 150,870 and 88,870. The

means for the first 12 months and last 12 months respectively are 289,231 and 157,876. After

assessing the mean and standard deviation of the variables, the samples had high standard

deviations in relation to the means. But, since the means did not exceed twice the standard

deviations in all three histograms, this suggests normality of the distribution. The remaining

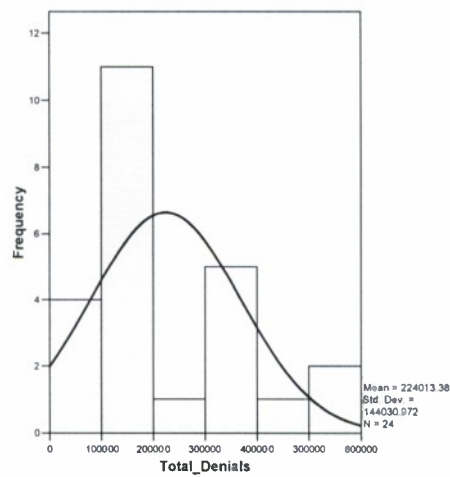histograms for different facilities and categories are shown in Appendix C, *Figures C1, C2, and*

C3.

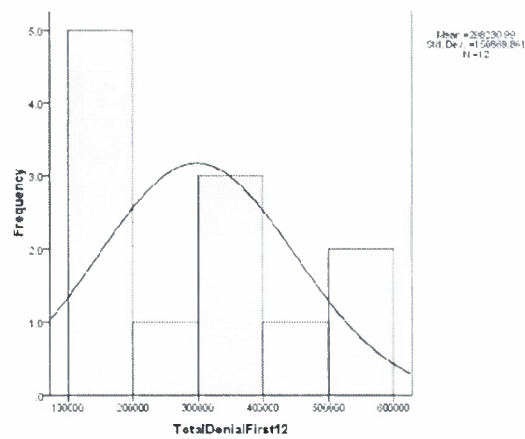*Figure 2.* Histogram of the total sample.
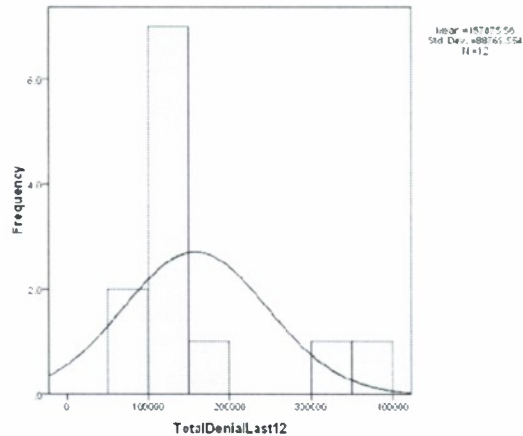

Figure 3. Histogram of the first 12 months sample.

Figure 4. Histogram of the last 12 month sample.

A second test for normality was conducted by producing P-P plots, *Figure 5, 6, and 7.*
The P-P Plot plots a variable's cumulative proportions against the cumulative proportions of any
of a number of test distributions. If the distribution of the variable matches a given distribution,
the points cluster around a straight line. The P-P Plot is a subjective measure and subject to
interpretation (Coppola, 2006). The closer to the like the circles are, then the more normal the
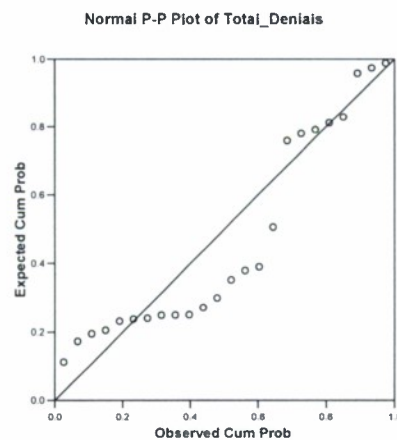distribution. The interpretation of these P-P Plots is that the distribution is normal.

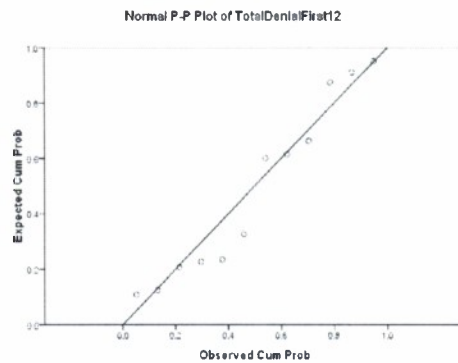*Figure 5.* P-P plot of the total sample.

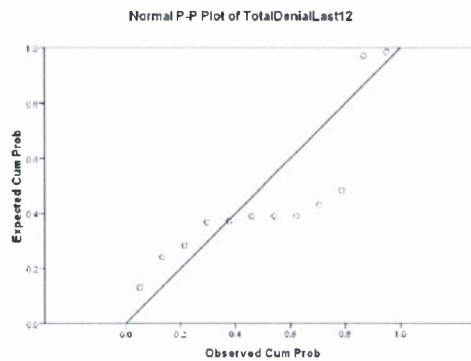*Figure 6.* P-P plot of the first 12 month sample.

Figure 7. P-P plot of the last 12 month sample.

A third test for normality is the Kilmogorov-Smirnov (KS) test, Table 7. Evaluation of

normality is based on a normal histogram and the KS test for normality is the disparity between

the observed and the expected cumulative distributions. The statistic result of the one sample KS

test is the Asymp. Sig (2-tailed) test. The KS test statistic ranges from 0 to 1. KS significance

levels closer to one suggests perfectly normal distributions, values closer to zero suggest non-

linear distributions. Unlike much statistical testing, a significant result below .05 is the result for

non-normality; results above the .05 level demonstrates normality. The result of the statistic

Asymp. Sig(2-tailed) is above the .05 level, meaning that the distribution with a parameter of
.143 and demonstrates normality.

Table 7.

One-Sample Kolmogorov-Smirnov Test for total sample

		Total_Denials
N		24
Normal Parameters(a,b)	Mean	228053.27
	Std. Deviation	140690.396
Most Extreme Differences	Absolute	.235
	Positive	.235
	Negative	-.132
Kolmogorov-Smirnov Z		1.149
Asymp. Sig. (2-tailed)		.143
a Test distribution is Normal.		
b Calculated from data.		

The fourth and last test for normality is the central limit theorem. The central limit

theorem is considered to be one of the most important results in statistical theory. It states that

means of an arbitrary finite distribution are always distributed according to a normal distribution,

provided that the number of observances for calculating the mean is large enough. Usually 10

observances are sufficient to result in an approximate normal distribution. The central limit

theorem is the reason why normal distributions are so frequent in nature (www.mathworld.com).

The central limit theorem is determined by the measures of central tendency: mean, median,

mode. The mean is perhaps the most commonly used measure of central tendency. The median

is also a very good measure. The median is better suited for skewed data or data with large

outliers. The mode is probably the least used because it can have a very different outcome from

the mean or median. In this data, the mean and median are similar, typically within 30% of one

another. The mode is non-existent in all samples. The distribution would suggest normal

distribution.

Power Analysis

To understand the power analysis of this study, the following description was taken out of the Quant III Course Pac from 2006 given during the Army-Baylor Program in Health & Business Administration and taught by LTC (Dr.) M. Nicholas Coppola, Phd.

Statistical power is the probability of getting a statistically significant result given that there is a real effect in the population being studied. Power analysis determines how strong the relationships are. If a particular test is not statistically significant, it may be because there is no effect or because the study design makes it unlikely that a real effect can be detected. Power analysis can distinguish between these alternatives - and is a critical component of testing results.

The power of a test is the probably of rejecting the null hypothesis given that the alternative hypothesis is true. Power depends on the type of test, sample size, effect size, and alpha level. Power declines with increasing sampling variance. Power is defined as 1-beta and can be interpreted as the probability of correctly rejecting the null hypothesis when it is in fact false. Researchers generally seek a goal of .80 in power. Beyond .80, the researcher achieves a point of diminishing marginal utility because the researcher would have to get bigger and bigger samples for little gain.

Assuming effective size of .30, the observed power for this study is only 30. This data does not show a strong power analysis. I believe this low result is due to the small sample size.

Trending

The main study was conducted on this data to determine whether claims data were declining over time. *Figures 8, 9, and 10* show trend lines for total denials over the last 24 months, the first 12 months and the last 12 months. Appendix C, *Figures C4, C5, and C6* show

trend lines of multiple categories of denials: by facility, by denial category and by patient

category. These figures are shown with a trend line and confidence interval lines shown at the

95% level. As shown in *Figure 8*, the total denial trend is trending down in a significant way.

This fit line shows an R^2 of .36. The closer to 1 the R^2 is means the closer the distribution is to

the fit line. If the R^2 equals one then every point on the distribution would be on the fit line. This

R^2 is significant combined with the fact that there are no outliers outside of the 95% confidence

interval. In *Figure 9* displays the first 12 month sample. This R^2 is .25 and all data points fall

within the 95% confidence interval. The trend line is dramatically sloping downward but still

maintains a fairly large angle in comparison to the mean line. This demonstrates that the BHS

was decreasing their denial rate even prior to implementing any formal procedures or review

teams. *Figure 10* displays the last 12 months of the data sample. This R^2 is .038 and all data

points fall within the 95% confidence interval. This sample displays an almost parallel trend

line, especially compared to the mean line. This sample demonstrates how in a small sample a

couple of data points have a significant influence on the R^2. This sample shows 10 of the 12 data

points almost in line with the slope line. This would suggest a large R^2, but the 2 data points that

were large numbers influenced the R^2 to a lower number. Despite having a low R^2, this sample

shows dramatically how much better the BHS denial rate not only lowered but also became more

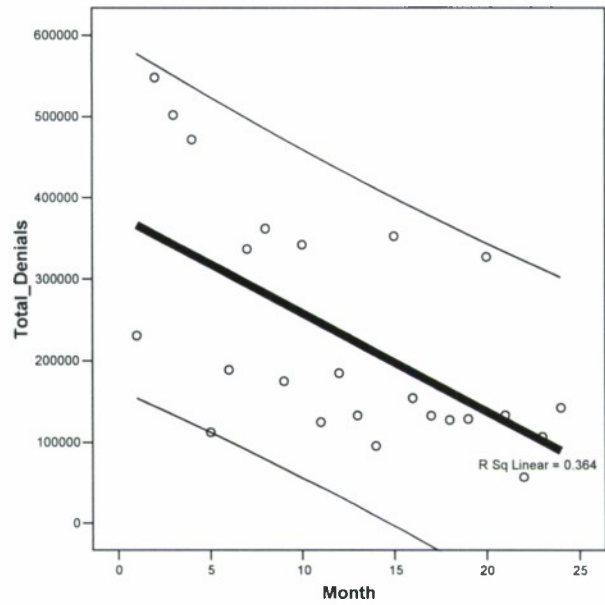consistent and more predictable for future planning.
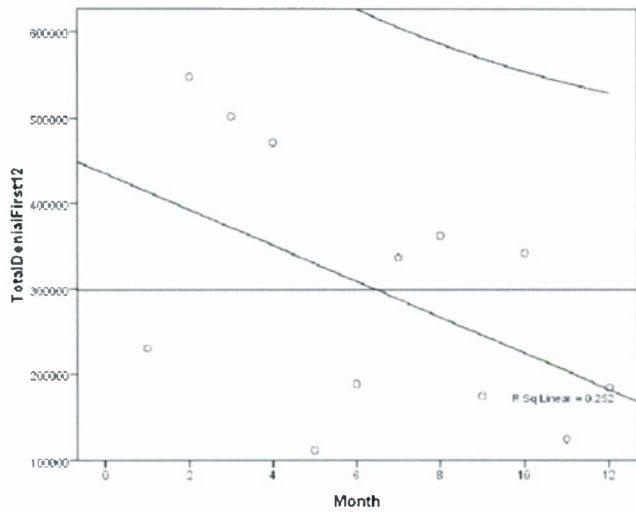
Figure 8. Trend line for Total Denials by month, n(24)

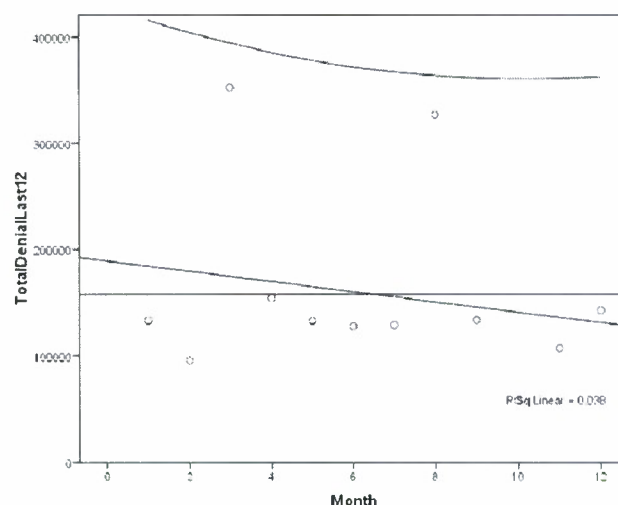*Figure 9.* Trend line for Total Denials first 12 month sample, n(12)

Figure 10. Trend line for Total Denials last 12 month sample, n(12)

The R^2 of .36, in *Figure 8*, is the second highest among the categories. This along with

no outliers shows that the data has been fairly stable over the last 24 months with zero

fluctuations. The highest R^2 was that of NEB, Appendix C, *Figure C4*, at .436. This is a very

high R^2 and shows that NEB has been the most stable facility within this health system in the

ability to reduce their denials. Although NEB did have a couple of outliers, these were early in

the sampling. The most current months show a tight distribution. The Denial Categories and the

Patient Categories show a very positive distribution within the last 12 months. Outside of one or

two spikes, all points were very close to the trend line. In fact, every trend line in every category

shows a positive downward trend. This is very promising for the BHS as a whole.

Conclusion

This study was to analyze the insurance claim denials to determine if BHS was increasing

(declining) or decreasing (improving) their denial rates. The NULL hypothesis was rejected and

the ALTERNATE hypothesis accepted. $F = 4.7 \, (4,115) \, p = .001$. The BHS has decreased their

overall denial rates by approximately 50% over the last 12 months (April 2006 to March 2007)

from the previous 12 months (April 2005 to March 2006). BHS also shows a positive downward trend in all the sub-study groups: facilities, denial categories and patient categories.

<div align="center">Additional Observations and Contributing Factors</div>

Although the BHS is only in its first year of analyzing denials data, the early results indicate that the BHS is well on its way of achieving the lower denials rates it desires. The BHS has been focused on improving the insurance claim denials in fiscal year 2006 into fiscal year 2007. This is demonstrated in *Figure 10* in that the trend line was very level over the last 12 months. Every month the Denial Management Action Team (DMAT) met to discuss these denial issues. The DMAT is a multi-disciplinary team developed from the entire BHS for the purpose of determining the root causes for denials, ways to improve denial rates, and policies and procedures to put into place. Within the DMAT, subgroups were developed to research and determine root causes for denials within the denial categories (medical necessity, level of care, timeliness, and authorizations). These root causes were discussed in-depth in these meetings and action plans were developed on how to improve the denial rates for each category. Positive outcomes were shown from the results of this. Although no formal policies or procedures have been put into place by the BHS (May 2007), denial rates have significantly dropped over the last 12 months compared to the previous 12 months. The drop is in the 50% range of improvement. The DMAT was not very organized in the early stages. The end result of what they wanted was known, but how to get there was still undetermined. Meetings would consist of arbitrary discussion with little information to make decisions. The DMAT should have had a better plan prepared of how they wanted to achieve their results.

I believe there were two main reasons for improvement of denial claims. The first is the experience and learning curves. Experience and learning curve models are developed from the

basic premise that individuals and organizations acquire knowledge by doing work. By gaining

experience through repetition, organizations and individuals develop relatively permanent

changes in behavior or learning (http://www.referenceforbusiness.com/management/Em-

Exp/Experience-and-Learning-Curves.html).

It is common for the terms *experience curve* and *learning curve* to be used

interchangeably. They do, however, have different meanings. According to definitions by Hall

and Howell (1985), the experience curve is an analytical tool designed to quantify the rate at

which experience of accumulated output, to date, affects total lifetime costs. Melnyk (1996)

defined the learning curve as an analytical tool designed to quantify the rate at which cumulative

experience of labor hours or cost allows an organization to reduce the amount of resources it

must expend to accomplish a task. Experience curve is broader than learning curve with respect

to the costs covered, the range of output during which the reductions in costs take place, and the

causes of reduction (http://www.referenceforbusiness.com/management/Em-Exp/Experience-

and-Learning-Curves.html). The learning curve effect states that the more times a task has been

performed, the less time will be required on each subsequent iteration. There are many reasons

for the experience curve: labor efficiency, standardization, training, technology, and value chain

effects.

The second reason for claims improvement is the Hawthorne Effect. The Hawthorne

Effect is the effect on a person's or a group's behavior of knowingly being under observation. It

is commonly positive or beneficial, because knowing that they are being observed encourages

people to behave or perform at a higher level of efficiency than they might otherwise

(http://www.answers.com/topic/hawthorne-effect-1). "Without question, the most important

contribution to the human relations movement within organizational behavior came out of the

Hawthorne studies undertaken at the Western Electric Companies Hawthorne Works in Cicero, Illinois" (Robbins, 2003). A result that Harvard professor Elton Mayo derived at was "group influences significantly affected individual behavior, which group standards established individual worker output and that money was less a factor in determining output than were standards, group sentiments and security" (Robbins, 2003). Appendix D provides a more detailed look at the actual Hawthorne studies.

The Hawthorne Effect and the Experience and Learning Curves combined seemed to achieve the initial goal of the BHS to decrease insurance claims denials rates. Having monthly meetings always kept the issue in the forefront and on people's minds. Also, by the leaders in the multi-disciplinary areas meeting and exchanging ideas and knowledge fed the experience and learning curve effects. Technology also attributed to the decline. As the different employees became more knowledgeable in the multiple information systems throughout the BHS, they became more efficient in calculating data. A little competition among the different hospitals helped also. At the DMAT meetings, denial information on all the facilities would be provided for all to see. One facility could see how it rates against another. The facilities knew they were being measured against one another, therefore, would want to do better.

<div align="center">Recommendations</div>

One of the more popular problem solving techniques in use today is The Six Sigma DMAIC (Define, Measure, Analyze, Improve, Control) Approach. If the BHS had known and used the Six Sigma DMAIC, this would have set the foundation on the process to possibly achieve better and/faster results in their denial rates. The Six Sigma DMAIC approach can or should be utilized in the development of a denial management plan. The Six Sigma DMAIC approach is an organized pointed problem solving approach. This approach is composed of five

steps: Define, Measure, Analyze, Improve and Control. Appendix E goes into more depth of the Six Sigma approach.

Although not formally using the six sigma approach, the BHS did in fact utilize it in the steps of Define, Measure and Analyze. The BHS is in the measuring and analyzing portion of the approach. BHS is well on its way to achieving even better rates in relation to their insurance claim denials through this analysis and measuring. I also recommend that the DMAT meetings be a standard meeting, possibly once a quarter as opposed to monthly. Out of these meetings, insure that policies and procedures are put into place to help standardize the entire BHS. Policies and procedures are currently being developed for implementation throughout the System. The DMAT always attempted to pursue policies and procedures that could be put into place for the entire system as a whole. This happened initially in the early stages of the analysis process. All facilities were doing the same actions in determining denial rates. The facilities' ANOVA table resulted in differences within the facilities total denial rates. This might suggest that the policies and procedures might not be an across the board change due to some differences in size and scope of the individual facilities.

The Baptist Health System should maintain the DMAT meetings in the future, as stated above, on a quarterly basis. Once policies and procedures are established and put into place, the DMAT format should change to a review and analysis format as opposed to strictly an improvement focus. Individual facilities should have to brief on the results of their facility and reasons why or why not they are not achieving the established standards.

The Baptist Health System and the DMAT are made up of consummate professionals. The early results indicate absolutely the BHS is well on its way of achieving the decreased denial rates they desire. BHS will have the detailed processes and procedures in place to manage

insurance claim denials in the very near future. These processes and procedures will allow the BHS to maintain low, manageable insurance claim denials. This low insurance claim denial rate will help propel and maintain financially the BHS into the health care leader in the greater San Antonio area.

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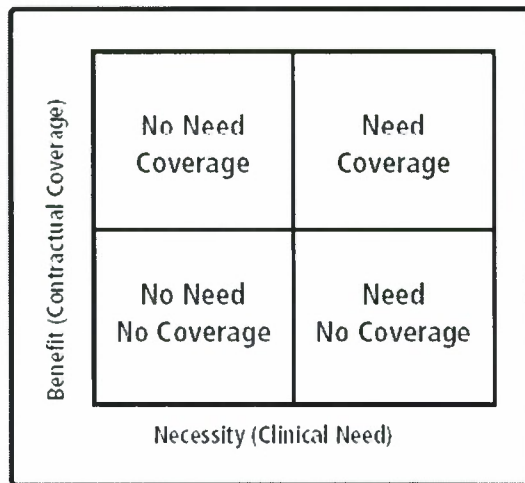Bare, J (2001).Making sense of health plan denials. *Family Practice Management*. *June*, 29-44.

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APPENDIX A: Medical Necessity

(Bare, 2001 page 41)

	Necessity (Clinical Need)	
No Need Coverage	Need Coverage	
No Need No Coverage	Need No Coverage	

(Benefit (Contractual Coverage) — vertical axis label; Necessity (Clinical Need) — horizontal axis label)

Need/Coverage. The upper right quadrant illustrates situations in which the health plan determines there is both clinical need and contractual coverage. Most care falls into this category.

Need/No Coverage. The lower right quadrant illustrates situations in which the health plan determines there is clinical need for a treatment but no coverage. For example, consider a patient who is a candidate for Viagra but whose employer has excluded the drug as a treatment for impotence.

No Need/No Coverage. The lower left quadrant illustrates situations in which the health plan determines there is no clinical need and no coverage for a particular treatment. For example, consider a request for surgery or a corrective device for a child born with a cranial deformity. Since health plans might argue there is "no observable adverse impact" from the deformity, the surgery could be deemed cosmetic rather than medically necessary, and cosmetic surgery is not a covered benefit under the terms of the family's contract with the health plan. Conflict is likely since the parents will probably perceive the existence of a very real need, even if the treatment is considered by the physician not to be medically necessary.

No Need/Coverage. The upper left quadrant, which illustrates situations in which a patient clearly has coverage for a proposed service but the health plan determines there is no need, has the greatest potential for conflict. The administration of epidural injections for a patient with acute, localized back pain and no prior administration of oral pain medications or other conservative and noninvasive therapies is one example.

APPENDIX B: ANOVA Tables

Table B1.

ANOVA Denial Category

Groups	Count	Sum	Average	Variance
Med_Nec	24	2082434	86768.1	9.79E+09
No_Auth	24	1764579	73524.13	1.64E+09
Timeliness	24	1529308	63721.16	3.6E+09

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	6.42E+09	2	3.21E+09	0.641141	0.52980	3.129642
Within Groups	3.46E+11	69	5.01E+09			
Total	3.52E+11	71				

Table B2

ANOVA Patient Category

Groups	Count	Sum	Average	Variance
ER	24	460497.15	19187.38	190820169.44
IP	24	3725381.28	155224.22	12550461172.92
OP	24	1196739.71	49864.15	1684366788.41

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.44383E+11	2	1.22191E+11	25.41	0.00000	3.12964
Within Groups	3.3179E+11	69	4808549377			
Total	5.76173E+11	71				

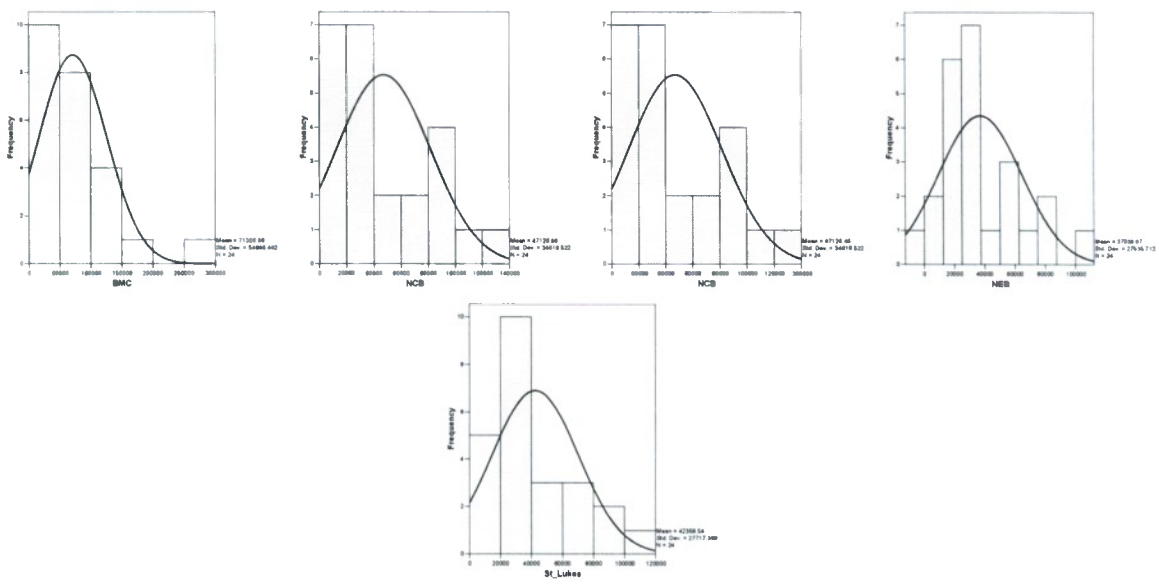APPENDIX C: FIGURES

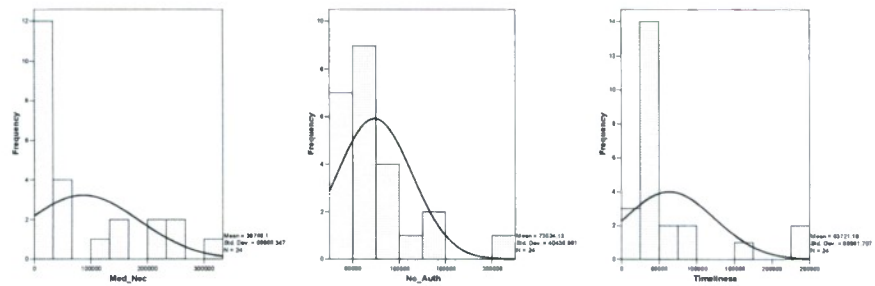Figure C1. Histogram for facilities.
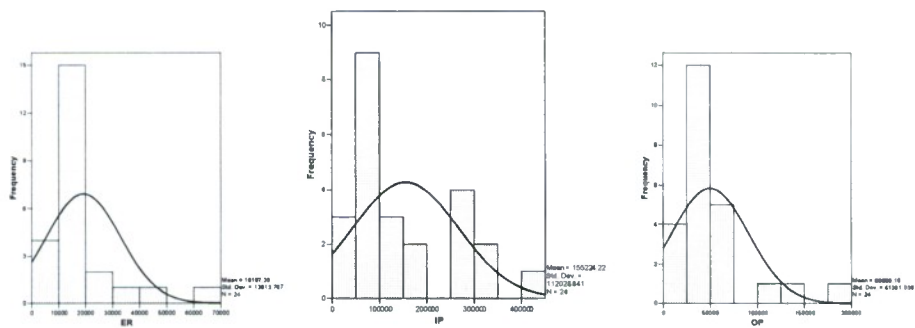

Figure C2. Histogram for denial category.

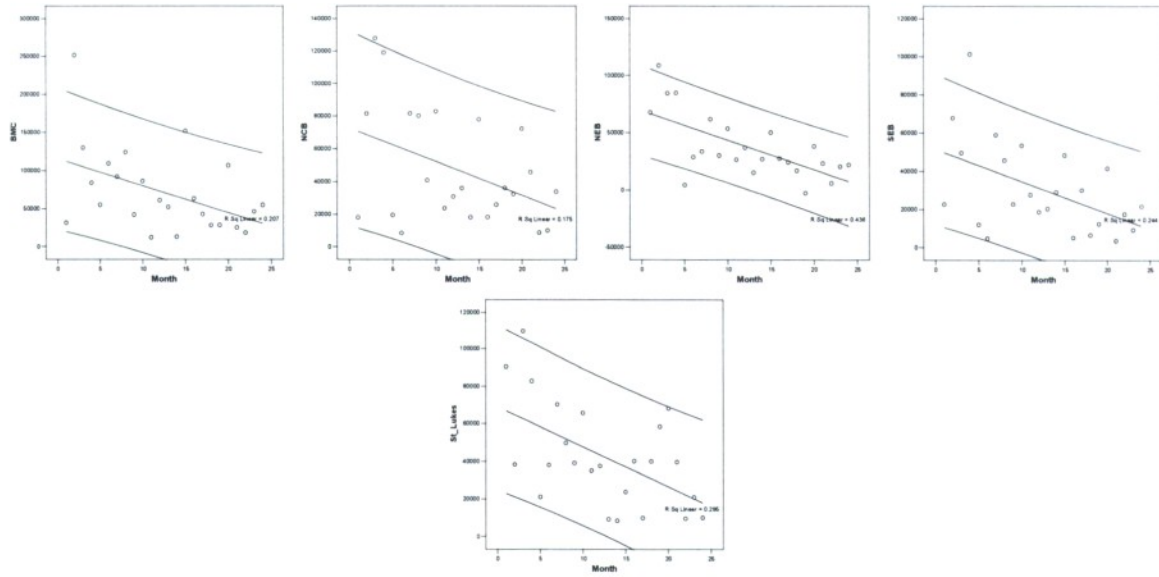Figure C3. Histogram for patient category.

APPENDIX C: FIGURES (cont)
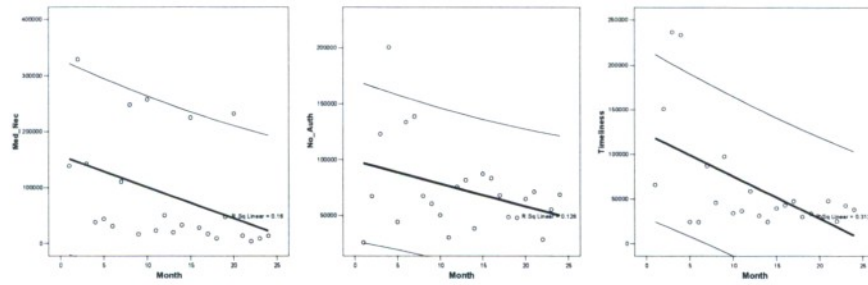

Figure C4. Trend lines for facilities

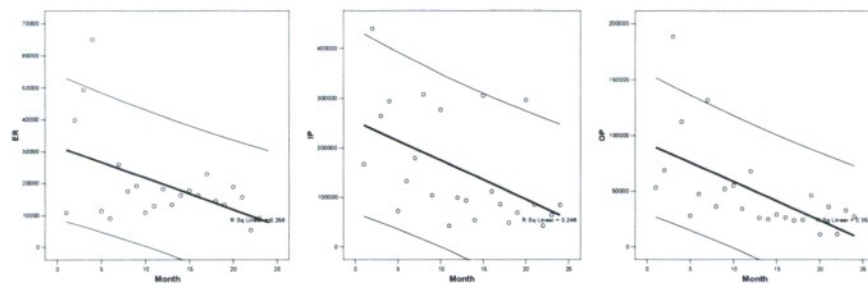*Figure C5*. Trend lines for denial categories

*Figure C6*. Trend lines for patient categories

APPENDIX D: Hawthorne Effect

The effect on a person's or a group's behavior of knowingly being under observation is called the "Hawthorne Effect." It is commonly positive or beneficial, because knowing that they are being observed encourages people to behave or perform at a higher level of efficiency than they might otherwise. Generally accepted psychological theory that the behavior of an individual or a group will change to meet the expectations of the observer if they are aware their behavior is being observed. In designing consumer research, this factor must be taken into consideration, by disguising or concealing the purpose or sponsor of the research. For example, if XYZ Company conducts a taste test and tells the subjects that XYZ Company produced beverage No. 1, most respondents will say they prefer beverage No. 1. Thus, it is not a true test. Similarly, if a test panel is told they are testing an appetite suppressant, they will begin to eat less. This behavior was documented by a research team led by Elton Mayo in the 1920s at the Western Electric Company Hawthorne plant. In studying the effect of lighting on productivity, the researchers found that, regardless of the lighting conditions introduced, productivity improved. In 1998, the original Hawthorne research was disputed by allegations that only five test subjects were studied and that two of those subjects had been replaced midstudy.

APPENDIX E: Six Sigma
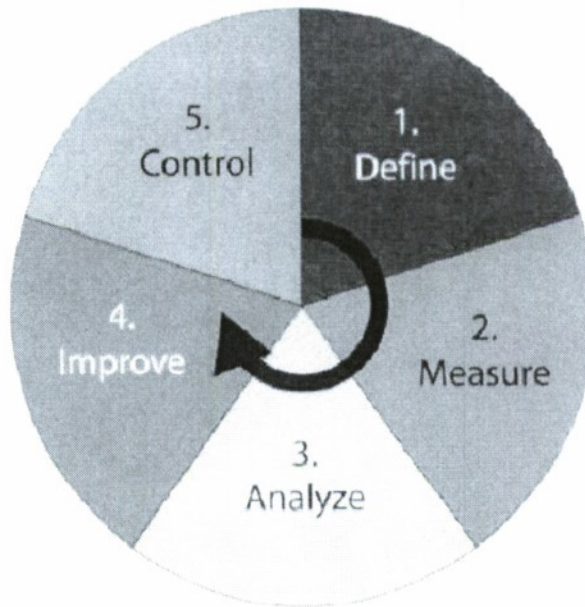
Developed by Motorola in the early 1980s, Six Sigma is a data-driven approach to

problem solving and long-term management that focuses on measuring and

reducing defects in the process. Under the Six Sigma philosophy, management

seeks to prevent defects to the point where it costs more in the long term to

correct the defect than to prevent its occurrence. Six Sigma differs from other

quality improvement processes with its focus on identifying and improving a

single process with a drive toward perfection (six sigma) rather than just

acceptable performance (businesses generally operate at about a four sigma). The

backbone of Six Sigma is data collection, allowing the organization to measure

key issues and to focus efforts for greatest benefit. A data focus allows the Six

APPENDIX E: Six Sigma (cont)

Sigma process to commit to quantifying the business impact of a problem and

monitoring results over time (light at the end of the tunnel).

By applying these best practices, an organization can substantially enhance their denial

management process and improve their bottom line.

Step 1, Define: What is the scope of the problem? This step is establishing a common

definition of the problem and the opportunity denials represent in which all divisions of the

organization agree on.

Step 2, Measure: How frequently do denials occur? This is when a quantifiable number

is established. Two questions that establish a baseline that must be asked are:

1.   How confidently can we state that all appropriate cases have been captured?

2.   What is the likelihood that there are unreported opportunities to recover

        nonpayment?

Step 3 in the Six Sigma DMAIC is to Analyze. Where and why do denials occur?

Performance improvement activities start at Step 4 in the Six Sigma DMAIC process;

Improve: How can we reduce denials?

The final step in the Six Sigma DMAIC process is Control: How can we sustain

improvement?

Waymack (2004) states that commitment to the Six Sigma principles is a strong approach

to reducing the financial impact of denials on your organization's revenues and expenses.